REMARKS/ARGUMENTS

1. Support for the Amended Claim Language and new claims 38-40.

The amended language "the joining tool is substantially prevented from moving in a direction crossing an axial direction thereof with respect to the lapped works from the time when the pin and the shoulder portion are pressed against the predetermined joint spot of the lapped works to the time when the joining tool is pulled out" and the description "the pin and the shoulder portion are inserted into the lapped works, and the lapped works are agitated by using the rotating pin and shoulder portion" in Claims 5, 18, 26 and 33 are supported by the description in the as-filed specification (from page 8, line 9 to page 9, line 4).

The amended language "a concave portion is formed at the joint spot of the lapped works on which the spot-joining was performed so as to conform in shape to the pin and the shoulder portion of the joining tool" is supported by the description (page 9, lines 5-9) in the as-filed specification and accompanying Fig. 4 as-filed.

2. Argument

The present invention is related to spot-joining. On the other hand, all of the cited references disclose only line-joining but do not disclose the spot joining. The Examiner should note that if the pin is moved in a direction perpendicular to the axis of the pin as in the cited references, the joint portion is filled with the agitated material of the lapped works, but if the pin is moved along the axis of the pin as in the present invention, the concave area is formed at the joint portion, conforming to the outer shape of the pin.

Hereinbelow, a more detailed description of the distinguishing features of the amended claims, with reference to the prior art applied against the claims, is provided.

(1) According to Heidman et al., as described in their specification (from column 5, line 47 to column 6, line 12), a pin 14 moves in a direction perpendicular to an axis thereof. This is also clear from a joint portion shown in Fig. 4, which is filled with agitated material of work pieces. Therefore, what Heidman et al. disclose is a line joining method.

Heidman et al. neither disclose nor suggest the amended feature of independent claims 5, 18, 26 and 33 of the present application in which "the joining tool is substantially prevented from moving in a direction crossing an axial direction thereof with respect to the lapped works from the time when the pin and the shoulder portion are pressed against the predetermined joint spot of the lapped works to the time when the joining tool is pulled out."

Furthermore, according to Heidman et al., as described in their specification (column 5, lines 57-59), a shoulder 18 is only in contact with a surface of the work piece but not inserted into the work piece. Therefore, Heidman et al. neither disclose nor suggest the feature of claims 5, 18, 26 and 33 in which "the pin and the shoulder portion are inserted into the lapped works, and the lapped works are agitated by using the rotating pin and shoulder portion."

Furthermore, Heidman et al. neither disclose nor suggest the feature of claims 38-40 in which "a concave portion is formed at the joint spot of the lapped works on which the spot-joining was performed so as to conform in shape to the pin and the shoulder portion of the joining tool."

(2) According to White et al., as clear from the description in column 3, lines 6-12, in their specification and accompanying Figs. 1 and 2, a pin 27 moves in a direction perpendicular to an axis thereof. It should be noted that although Fig. 1 illustrates column-shaped channels as being continuously formed, reading of the above-mentioned description in their specification reveals that the channel is formed in a form of groove with a constant width. Therefore, what White et al disclose is a line joining method. White et al. neither disclose nor suggest the feature of amended independent claims 5, 18, 26 and 33 of the present application in which "the joining tool is substantially prevented from moving in a direction crossing an axial direction thereof with respect to the lapped works from the time when the pin and the shoulder portion are pressed against the predetermined joint spot of the lapped works to the time when the joining tool is pulled out."

Furthermore, according to White et al., as shown in Fig. 2, only a portion of the pin 27 is inserted into lapped works. Therefore, White et al. neither disclose nor suggest the feature of amended claims 5, 18, 26 and 33 in which "the pin and the shoulder portion are

inserted into the lapped works, and the lapped works are agitated by using the rotating pin and shoulder portion."

Furthermore, White et al. neither disclose nor suggest the feature of amended claims 38-40 in which "a concave area is formed at the joint spot of the lapped works on which the spot-joining was performed so as to conform in shape to the pin and the shoulder portion of the joining tool."

(3) Thompson discloses a butt joining method. Thompson neither discloses nor suggests either of the two amended features of claims 5, 18, 26 and 33 nor the feature of new claims 38-40 of the present application.

(4) Consequently, claims 5-40 of the present application are neither anticipated nor obvious from any one of the cited references.

It is submitted that all claims are now of proper form and scope for allowance. Early and favorable consideration is respectfully requested.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned **"Version with markings to show changes made."**

Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue.

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Respectfully submitted,

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Version With Markings to Show Changes Made

5. (Amended) A spot joining device comprising:

a joining tool having [a pin] a column-shaped shoulder portion at a tip end portion thereof [the] and a pin protruding from an end face of the shoulder portion [being protruded] along an axis [of the joining tool] thereof;

a rotation motor for rotating the joining tool around the axis thereof; and

a motion motor for moving the joining tool along the axis thereof, wherein

the joining tool is moved along the axis by the motion motor while the joining tool is rotated by the rotation motor,

the pin [is] and the shoulder portion are pressed against a predetermined joint spot of lapped works to be joined and inserted into the predetermined joint spot heated and softened due to friction heat,

portions of the lapped works that are in the vicinity of the predetermined joint spot are agitated by using the rotating pin and shoulder portion, thereby leading to the lapped works being fused at the predetermined joint spot,

the joining tool is then pulled out along the axis by the motion motor, [whereby]

the joining tool is substantially prevented from moving in a direction crossing an axial direction thereof with respect to the lapped works from the time when the pin and the shoulder portion are pressed against the predetermined joint spot of the lapped works to the time when the joining tool is pulled out, and

whereby the lapped works are spot-joined at the predetermined joint spot.

18. (Amended) A spot joining method comprising the steps of:

rotating a joining tool having [a pin] a column-shaped shoulder portion at a tip end portion thereof [around an axis of the joining tool] and a pin protruding from an end face of the shoulder portion along an axis thereof with the pin and the shoulder portion pressed against a predetermined joint spot of lapped works to be joined [the pin being protruded along the axis];

inserting the pin and the shoulder portion into the predetermined joint spot of the lapped works heated and softened due to friction heat;

agitating portions of the lapped works that are in the vicinity of the predetermined joint spot by using the rotating pin and shoulder portion, thereby leading to the lapped works being fused at the predetermined joint spot, [and]

pulling out the joining tool along the axis [thereby performing spot joining of the lapped works at the predetermined joint spot], and

substantially preventing the joining tool from moving in a direction crossing an axial direction thereof with respect to the lapped works from the time when the pin and the shoulder portion are pressed against the predetermined joint spot of the lapped works to the time when the joining tool is pulled out, thereby performing spot joining of the lapped works at the predetermined joint spot.

26. (Amended) An outer plate of an automobile manufactured by a method for spot-joining works at a joint spot, the method comprising the steps of:

rotating a joining tool having [a pin which is protruded along the axis] a column-shaped shoulder portion at a tip end portion thereof and a pin protruding from an end face of the shoulder portion along [around] an axis [of a joining too] thereof with the pin and the shoulder portion pressed against a predetermined joint spot of lapped works to be joined which constitute an outer plate of an automobile,

inserting the pin and the shoulder portion into the predetermined joint spot of the lapped works heated and softened due to friction heat,

agitating portions of the lapped works that are in the vicinity of the predetermined joint spot by using the rotating pin and shoulder portion, thereby leading to the lapped works being fused at the predetermined joint spot, [and]

pulling out the joining tool along the axis, [thereby performing spot joining of the lapped works at the predetermined joint spot] and

substantially preventing the joining tool from moving in a direction crossing an axial direction thereof with respect to the lapped works from the time when the pin and the shoulder portion are pressed against the predetermined joint spot of the lapped works to the time when the joining tool is pulled out,

thereby performing spot-joining of the lapped works at the predetermined joint spot.

27. (Amended) A joining tool for spot-joining, wherein the joining tool [having] has a column-shaped shoulder portion [which is protruded along the axis] at a tip end portion thereof and a pin protruding from an end face of the shoulder portion along an axis thereof is

rotated around [an] the axis [of the tool] with the pin and the shoulder portion pressed against a predetermined joint spot of lapped works to be joined, the pin and the shoulder portion [is] are inserted into the predetermined joint spot of the lapped works heated and softened due to friction heat, portions of the lapped works that are in the vicinity of the predetermined joint spot are agitated by the rotating pin and shoulder portion, the lapped works are fused at the predetermined joint spot, the joining tool is pulled out along the axis, the joining tool is substantially prevented from moving in a direction crossing an axial direction thereof with respect to the lapped works from the time when the pin and the shoulder portion are pressed against the predetermined joint spot of the lapped works to the time when the joining tool is pulled out, thereby the spot joining is performed, and a tip end portion of the pin has a raised central portion thereof.

33. (Amended) A joining tool for spot joining, wherein a joining tool having a [pin which is protruded along the axis] column-shaped shoulder portion at a tip end portion thereof and a pin protruding from an end face of the shoulder portion along an axis thereof is rotated around an axis of the joining tool with the pin and the shoulder portion pressed against a predetermined joint spot of lapped works to be joined, the pin [is] and the shoulder portion are inserted into the predetermined joint spot of the lapped works heated and softened due to friction heat, portions of the lapped works that are in the vicinity of the predetermined joint spot are agitated by using the rotating pin and shoulder portion, the lapped works are fused at the predetermined joint spot, the joining tool is pulled out along the axis, the joining tool is substantially prevented from moving in a direction crossing an axial direction thereof with respect to the lapped works from the time when the pin and the shoulder portion are

pressed against the predetermined joint spot of the lapped works to the time when the joining tool is pulled out, thereby the spot-joining is performed,

a tip end portion of the pin has a raised central portion thereof, and the pin is coaxially protruded from an end face of a short-column shaped shoulder.

38. The spot joining device according to claim 5, wherein a concave portion is formed at the joint spot of the lapped works on which the spot-joining was performed so as to conform in shape to the pin and the shoulder portion of the joining tool.

39. The spot joining method according to claim 18, wherein a concave portion is formed at the joint spot of the lapped works on which the spot-joining was performed so as to conform in shape to the pin and the shoulder portion of the joining tool.

40. The outer plate of an automobile according to claim 26, wherein a concave portion is formed at the joint spot of the lapped works on which the spot-joining was performed so as to conform in shape in the pin and the shoulder portion of the joining tool.